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ABSTRACT

The paper provides a rationale for using a decision-making model in teaching environmental issues, outlines specific steps in creating a simulation, and illustrates its use in the classroom. The objectives of environmental education are to provide learning opportunities for students to know, think, choose, and act regarding pervasive social issues from local to global levels. The primary goal of social simulations is to involve students in approximations of real-life, environmental issues. Ideally, simulations will encourage students to become actively involved in their own preparation to make political, social, and personal decisions. Procedures for a decision-making model include identifying a problem, defining the desired solution, identifying alternatives for accomplishing the desired outcomes, and selecting the best alternative. The hypothetical classroom situation which concludes the document involves applying decision-making procedures to the problem of storage of toxic chemicals near a school playground.
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Occasional Paper #5

Dealing with Environmental Issues:

The Use of Simulation

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Office of Environmental Education
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September, 1979

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FOREWORD

The combination of social participation, decision making, and environmental issues included in this occasional paper has been developed through the experiences of the authors over a period of more than 10 years. During the late 1960's and early 1970's, Dr. Patton involved his students in the environmental issues of their community. These issues included strip mining by a gravel company, dumping of waste oil from a service station into a nearby stream, and illegal dumping of garbage near the school. The students found they could make a difference in the environment through social participation.

Both authors were consultants for the Mentor School District when the decision making model was developed and incorporated into social studies units written by district personnel. The simulation component was added for a presentation at the 1976 annual conference of the National Council for the Social Studies in Washington, D.C. Refinements in the initial version of the environmental issue simulation have resulted from its use by many preservice and inservice teachers. Teachers have used the model quite creatively in elementary and secondary schools.

SOCIAL STUDIES GOALS AND ENVIRONMENTAL EDUCATION

Close your eyes for a moment and think of what environmental crises mean to you. Did you picture a starving family on a city street in India, a supersonic transport taking off from a Paris airport, or hunters slaughtering baby seals in Greenland? Perhaps your thoughts were on a national level. Did you picture an oil slick drifting toward a scenic beach on the Gulf of Mexico, an exploding nuclear reactor in an eastern state, or an out-of-control forest fire in a western state? Or, on a local level, did you picture a decaying slum area of your city, the "No-Swimming-Because-of-Pollution" sign by the lake outside of your town, or a block-long line of cars at your neighborhood gas station?

Even more to the point, how will your students picture what an environmental crisis means to them? After all, they are the recipients of our generation's, and past generations', damaging approach to using and abusing nature's resources. It should be clear that the mindless life style we have created to satisfy self-indulgence must be altered drastically if we are to survive psychologically and physically. The solutions to environmental problems and related problems faced by world citizens rest in the education of future citizens--today's students.

The environmental education movement has its roots in the nature, conservation, and outdoor education movements starting in the 1920's and 1930's. But it was not until the 1950's and 1960's that awareness of environmental problems led to the realization that "humankind was a part of the environment." Swan (1975) succintly reasoned the change: "The environmental movement took seed in the realization that humankind, to survive indefinitely, must take an ecocentric view of life rather than an egocentric view, that we must amelioriate our impact by knowing what it is

likely to be before we act."

The environmentalism of the 1960's led to environmental education after the massive national response to Earth Day in April, 1970. Shortly after this, the Environmental Education Act appropriated limited funds for educational programs through grants. As we became more aware of the wide range of environmental issues and problems faced by Spaceship Earth, we realized that citizens needed to be more directly informed, concerned, and involved in actively seeking solutions.

What role should the schools have in producing a citizenry capable of dealing with environmental issues and concerns? A partial answer can be found in the analysis of environmental education goals. The Environmental Education Report (1976) provides a comprehensive goal statement:

> ...develop a world population which is aware of, and concerned about, the environment and its associated problems, and which has the knowledge, skills, attitudes, motivations and commitment to work individually and collectively toward solutions to current problems, and the prevention of new ones.

This statement suggests three major student role components that can be facilitated by the teacher:

1. Values Component - students who value the environment as indicated by their concern about related issues and problems and who are committed to improving it;
2. Knowledge Component - students who possess the facts related to environmental issues and the skills necessary to make decisions that may lead to the resolution of problems; and,
3. Action Component - students who are willing to implement decisions and actively participate in the improvement of their environment.

In order for students to learn and assimilate these role components, as citizens concerned about the environment, a variety of skills, primarily related to decision making, need to be developed. Effective citizens are those who critically reflect on issues and problems, make decisions based on available facts and knowledge and clarified attitudes and beliefs, and actively participate in the resolution of the problems. As decision makers students need to learn how to: (1) identify, clarify, and define a problem; (2) devise alternative solutions to the problems; (3) gather valuative and nonvaluative data in order to reduce the alternative solutions to one feasible solution; (4) devise a plan for implementing the solutions; (5) implement the plan; (6) review its progress toward resolving the problem; and (7) evaluate the outcome of their efforts.

Although the proponents of environmental education strongly advocate an interdisciplinary approach to teaching the necessary knowledge, values, and skills, only one subject has as its major goal the production of humane, rational, and participating citizens who are equipped with the skills to make decisions leading to the resolution of societal issues and problems--the social studies. With the publication of the newly revised curriculum guidelines, the National Council for the Social Studies has encouraged teachers to re-examine their goals in preparing effective citizens (NCSS, 1979). The new emphasis focuses on providing learning opportunties for students to know, to think, to choose, and to act regarding pervasive and enduring social issues from local to global levels. Environmental concerns is specifically mentioned as one of the contemporary and controversial areas that must receive more attention.

The implications of the guidelines for environmental education are numerous:

1. Students must be able to know: The purpose of knowledge is to provide the reservoir of data, ideas, concepts, generalizations, and theories necessary for students to think, clarify values, and participate in the resolution of associated problems.
2. Students must be able to think: Intellectual skills need to be developed in order to engage in convergent and divergent problem solving leading to a greater enhancement of decision-making power.
3. Students must be able to choose: Decisions are strongly influenced by values. Students need systematic and supportive assistance in clarifying and analyzing value conflicts among persons and groups, and within themselves.
4. Students must be able to participate: Social participation is the active application of knowledge, thinking, and values for addressing contemporary issues and resolving problems facing society.

These four curriculum components are crucial and equally important. "Each interacts with the other. Each nourishes the others" (NCSS, 1979, p. 226).

DECISION MAKING SIMULATION AS AN INSTRUCTIONAL STRATEGY

For the purposes of this paper, simulation has been selected as the instructional strategy best suited for effective teaching of decision making. In order to present a rationale as to why this approach was selected, a clarification of terms closely related to simulation seems necessary.

Teachers tend to use the terms simulation, game, and simulation-game interchangeably when actually there are major differences. Gilliom (1977) makes a distinction between them. Educational games involve the students in competition governed by rules and a method of determining winners and losers. A teacher who selects a game as a method of instruction is not attempting to provide students with representations of the real world because games deal with social phenomena only in a limited way. Examples of educational games include Monopoly, WFF'N Proof (The Game of Modern Logic), and the Propaganda Game.

The primary goal of simulation--or more appropriately, social simulation--is to involve students in approximations of real-life, environmental situations. Role playing is a major component of most simulations whereby students act out characters and interact within represented situations. Competition, producing winners and losers, is not a means or an end in a simulation. Examples of simulations include students experiencing the realities of urban life or stock market investments in the classroom.

Simulation-games combine the competition feature of educational games with the social reality depiction of simulations. Because the emphasis is on involving students in operating models of social processes, the emergence of winners and losers is only a secondary consideration. The competition feature is necessary only if students need to analyze the processes of and forces within the competition in order to better understand the real social or environmental situation being portrayed.

Simulations help prepare students to make the transition from the classroom to the real world. Traditionally, the emphasis of the social studies has been on the transmission of information to passive students with little regard for the application of what has been "learned."

Students saw little relevance in what was taught because it did not relate to their present or future lives. In contrast, the thrust of contemporary social studies is on developing students' critical thinking skills as they engage in inquiry, decision making, and social action. The end product is citizens equipped with the necessary skills to reflect critically on societal issues and problems and actively participate in their resolution.

The transfer of learning to other situations in the real world is crucial if students are to see relevance in what they are being taught. As an instructional strategy, simulation is designed to achieve the goal of uniting learnings and application by engaging students in role playing and problem-solving experiences that are representations of reality. Simulations, ideally, will encourage students to become actively involved in their own preparation to make political, economic, social, and personal decisions as young adults.

The rationale underlying the decision making simulation is that students best comprehend and see relevance in the skills of decision making by experiencing it. Although most social simulations incorporate situations in which students must make decisions as a means to achieve goals, the decision making simulation focuses on students experiencing the process of decision making as a major goal. Within the decision making simulations students assume roles that they will have to assume when they leave the classroom. Within these roles they learn the skills of generating alternatives, identifying associated values, anticipating consequences, and formulating strategies--necessary requisites to make rational decisions to govern behavior. Students experience the consequences of decisions within the context and control of the simulation. The decisions made in the simulation

are determined by factors similar to those that may determine the outcomes of the real situation.

There have been many claims about the value of simulation, games, and simulation-games. Some of the more frequently mentioned claims include: (1) students become more motivated, cooperative, and empathetic; (2) they have the opportunity to interact with peers; (3) they begin thinking at higher cognitive levels and begin applying critical thinking skills; and (4) they enjoy learning more.

Based on an extensive review of the research, Livingston and Stoll (1973) presented several generalizations that support the use of the decision making simulation:

1. Simulations are as effective as traditional methods of instruction when the teaching of knowledge and intellectual skills are the focus;
2. Students' opinions and attitudes change as a result of engaging in simulations with their attitudes becoming more realistic and accepting of the roles of the "real life" persons they have played; and,
3. Students prefer simulations over traditional classroom activities.

The supportive evidence, provided by practicing teachers and educational researchers, for using simulation in the classroom creates the basis for a valid instructional strategy to enhance learning.

The use of simulation in environmental education brings two important educational outcomes together. First, the persons who design any simulation activity must identify the specific skills and roles they want developed in the students. The organization of the simulation would facilitate the

development of the skills and roles. Second, the process using simulation to achieve outcomes involving decision making for social action--makes it possible to identify the procedures that will be used to accomplish the skill and role outcomes. Simulation activities bring these two together--the skills and roles and the procedures for accomplishing them.

THE DECISION MAKING MODEL

Decision making is a part of every person's daily life. The number of times during a single day an individual selects from among two or more alternatives which leads to a decision are almost too numerous to count. The actual process used to make these decisions is rarely analyzed to identify the steps in the decision making process. If the time were taken to do the analysis, then specific steps would emerge. These would include: (1) the identification of a problem or decision setting; (2) defining the desired solution; (3) identifying alternatives for accomplishing the desired outcomes; and (4) selecting from among two or more alternatives the "best" alternative. These steps, of course, are simplistic from a decision theory perspective. They do, however, provide a general picture of the sequence of events students must use in making everyday decisions that have an impact on the environment in which they live.

The amount of information available in the popular press and technical publications that deals with problems in the environment increases daily. The information is characterized by a large amount of factual data and the presentation of one or more value positions. Both of these characteristics--factual data and value positions--are essential elements in a decision making

process. By using a strategy for decision making in the classroom that brings the facts and values together, students will become more effective citizen decision makers when environmental issues arise.

We believe that a simulation which is designed to engage students in decision making for social action must have the capacity to move students from exclusively cognitive interaction with problems of the environment to actual interaction with the dynamics of participation in the solutions to the problems. Amitai Etzioni's (1968) decision-making model has been selected for this paper because it meets the important requirement of providing a vehicle for dealing with facts and values as well as developing the skills needed to address problems of the environment.

The Etzioni model is called "mixed scanning" and is made up of five steps. The first step of the five-part strategy is the identification of a personal or societal problem. It is in this step that students perceive a need to solve a problem because they are motivated to reduce the difference between a real condition and the ideal condition. The second step is the search for alternatives to reduce the difference between the real and the ideal conditions. During this step students gather information. The objective is to provide a variety of alternatives for resolving the problem and, subsequently, narrowing the list to several feasible alternatives.

Once the students have reduced the alternatives, it is then possible to enter the third step which is identifying a single alternative. A more thorough analysis of the factual information in view of the various value positions is conducted until one alternative has been selected. The various value positions that are used to assess alternatives are established from several sources. Some alternatives may conflict with the decision maker's values. Others may not go against the values of the decision maker,

but may be incompatible with the values of other important individuals or groups influenced by the decision. Another possibility may arise making it feasible to reduce alternatives because the resources and time for implementing an alternative are not available. It is rare when a single alternative emerges as the only possible course of action.

The fourth step involves the rank ordering of the two or more alternatives that have passed the screens in step three. Additional information can be gathered. Students must identify and communicate their own choices. Rank ordering can be accomplished through consensus or voting.

The final step synthesizes the decision for implementation. That is, the students deal with the logistics of solving the problem and developing a full implementation plan. The progress of the implementation plan is reviewed on a regular basis and, if needed, alternative subplans are developed. The end goal of reducing or eliminating the difference between the identified problem in its real condition and the ideal condition that would see the elimination or major reduction in the problem serves as the cohesive unit linking the five steps.

In order to illustrate the use of Etzioni's model in environmental education through simulation, a hypothetical classroom situation is presented below.

A CLASSROOM SIMULATION

Newspapers and television report regularly on the problems that arise from the movement of toxic materials in the United States. These problems are faced by citizens in many localities. Rail cars filled with

certain chemicals can level a large area if they explode. Another train may include tanker cars filled with deadly gas. Trucks moving along an interstate could be carrying radioactive waste from a nuclear power plant to a disposal site. Regardless of whether the toxic materials are being moved for use in industrial production or for disposal purposes, the potential exists for endangering people and the environment.

The proximity of large numbers of people, their homes, schools, and hospitals, to the the roadways and rail lines that move vast amount of potentially harmful material throughout Ohio is of concern to more and more citizens. There are over 100,000 miles of railroad tracks and roads for motorized vehicles in the Buckeye State. Each mile becomes a possible disaster site when one considers the number of accidents that occur each day.

These statistics were gathered by members of Ms. Nelson's seventh-grade class. The students, because of an integrated science and social studies unit, were focusing on environmental hazards in their city. A series of reports was given on the nature of chemicals used in all aspects of city life, their potential side-effects if accidents occurred, and the mode of transportation for moving the chemicals in and out of the city. Wall charts, collages, and maps were three types of visuals students prepared to support their oral and written work. One specific map which had been prepared by Jill and Greg caught the attention of Mark. The map showed the location of each manufacturing operation in the city, the chemicals used in production, and the storage method and site for the chemicals at the various locations. Midtown Chemical stood out in Mark's mind.

During the discussion that followed the week of reports, Mark asked other members of the class if they had noticed the method and location

of chemical storage at the Midtown plant. No one in the class responded. Ms. Nelson asked him to share his reason for asking the question. Mark went to the map and explained that chemicals used at Midtown were stored within the property of the plant according to the key used by Jill and Greg. He then asked for a show of hands from those students who had attended Central Elementary School. A total of seven students raised their hands. A second question was asked, "What do you remember about the playfield at Central?" Several responses were given. One of the responses noted bad smells on the playground.

Mark then shared his insight with the class. While attending Central he remembers two things. First, a number of foul smells frequently spread across the school property. Second, he can recall seeing tanker cars on a railroad siding that ran parallel to the school's playfield. The tracks were approximately 75 yards from the school fence. The chemical plant itself was two blocks away. Mark expressed his feeling that the map should also show the temporary storage at the railroad siding. Jill indicated that she and Greg had gathered their information on Midtown Chemical from her next door neighbor who was a shift boss at the plant. Before the discussion could go any further, the bell rang dismissing the class. Ms. Nelson told the students to think about the points Mark had raised in the discussion and that they would begin towmorow's class with a continuation of the topic.

The next day the students were eager to begin. Jill and Greg had talked with the supervisor at the plant again. Mark had a discussion with some of his former classmates at Central and three of them went back to look at the siding. Another student had made note of the chemicals used at Midtown. One chemical was of particular interest and concern.

Several hands shot up as Ms. Nelson moved to the front of the class to start the discussion. She called on Jill first. Her comments, with input from Greg, summarized the brief interview they had with the supervisor. It was true that the siding could be considered a storage site, but only for very short time periods. The plant employee indicated that orders for chemicals had to be placed months in advance and it was sometimes difficult to calculate the exact rate of use because of unforeseen circumstances such as production slowdowns or equipment failures. If a storage tank could not hold an entire shipment, then the tanker cars were held on the siding near the school until the shipment could be transferred. Cars were not held on the siding longer than two or three days. The group that had gone back to the elementary school reported the storage of four tanker cars on the tracks the previous afternoon. Finally, Pat shared with the class the fact that one of the chemicals used at the plant was highly toxic and detrimental to humans. She reminded the students of her report which presented its side effects, particularly after periods of prolonged exposure.

Ms. Nelson had served as a recorder during the initial discussion. Several points were written on the board. She asked the class if there was additional information anyone had that should be added to the list of facts. One student pointed out that the siding was 18 feet from the main rail line that runs through the city. Trains travel more than 30 miles an hour, in most cases, when moving on the main line. Another student indicated that a recent report from Washington, D.C., identified the chemical as a cancer-causing agent. Mark raised his hand and said, "We have a problem!"

Ms. Nelson asked the class for a show of hands from those who remembered the steps they had learned for solving people-related problems. Nearly all of the students responded. "We can start by identifying all aspects of the problem," she stated. Different students suggested their views of one or more aspects of the problem. They were listed on the chalkboard. When they were finished, more than 20 items had been enumerated. The list included: (1) health hazard; (2) illegal storage of dangerous chemicals; (3) public safety; and, (4) power of big business. As the class came to an end, the teacher asked Mark to prepare a summary of the problem as he saw it based on the information generated by the students.

Class started Monday morning with Mark reading a prepared statement. After he was finished, Betty asked why he had not included the medical hazard of the chemical. After agreeing with the suggestion, Mark wrote the problem statement on the chalkboard. The teacher then continued the first step of the simulation by asking the students to identify the ideal condition that would either eliminate the problem in its entirety or significantly reduce the discrepancy between the current condition (problem) and the desired condition (ideal). The students were not unanimous concerning the idea. It was again necessary to synthesize the various students' views. The more conservative opinions desired fixed limits on the amount of time tankers could be stored on the railroad siding while a radical position suggested rerouting the railroad line to the chemical plant to avoid the school. Once the ideal condition had been formulated to encompass an many perspectives as possible, both the problem statement and the ideal condition statement were reproduced on a mimeographed sheet and given to each student.

The statements are the focus for the next two steps in the simulation. Ms. Nelson gives the students three days to develop various alternatives that

will reduce or eliminate the problem. No restrictions are placed on the students during their search for alternatives. Before an alternative becomes a viable choice, however, it must be stated clearly and be accompanied with a rationale. The alternative and rational are reproduced on a 5" x 8" card and distributed to the entire class. More than one approach can be used to present the alternatives and assess the value elements before the class. The teacher could use a court room format or formal debate. Another approach might be writing an editorial discussing each alternative. The editorials could be placed in a classroom newspaper or an issues bulletin. The purpose, regardless of the instructional strategy, is to present all information to every member of the class.

The different alternatives are then examined by the class. The information is necessary to assess the various value positions and narrow the alternatives. Ideally, the elimination of all possibilities except one is desirable. This rarely happens, however. Students may need to gather additional information on any alternatives that remain after the initial screening for conflicts with critical participants' values or the lack of adequate resources to implement the solution. The students will examine the remaining alternatives for a second time. As many as three or four cycles may be necessary before a single alternative or a compromise combination can be selected, thus completing the third and fourth steps of the simulation. Ms. Nelson's role during these steps is to facilitate student dialogue.

The final step of the simulation in the seventh-grade classroom develops when the students design a plan for doing what the selected alternative suggests. Someone must be identified to assume a leadership role. Ms. Nelson is careful not to place herself in that role. The teacher is a facilitator;

the students are the critical actors. This step can be accomplished through role playing. Various roles such as company officials, environmental protection agency personnel, and citizens engaged in social action are given to class members. Value conflicts must be resolved during the process. Different value clarification strategies might be used. The critical skill developed by the students in Ms. Nelson's class involves making and implementing decisions that deal with important problems of their environment.

CONCLUSION

Even though the steps outlined above involve simulation in a classroom, a teacher should never lose sight of the possibility that the actions taken by students can be implemented in the real world. A number of problems are within the realistic scope of student action. Problem areas identified in Appendix B can move from simulation in the classroom to social action in the community. It has been done!

Students investigated a problem that was important to them. They followed a systematic plan and learned about the decision making process. When students have direct control of the process, the intrinsic motivation needed to move through the steps is often created. The steps are not going to work with all students in every classroom. They do provide, however, another alternative for actively involving students in the learning process.

Citizens in the 1980's must be able to think critically about the issues involving their environment. The use of a simulation model for decision making such as the one described in this paper can move students from just knowing to acting on critical environmental issues.

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APPENDIX A

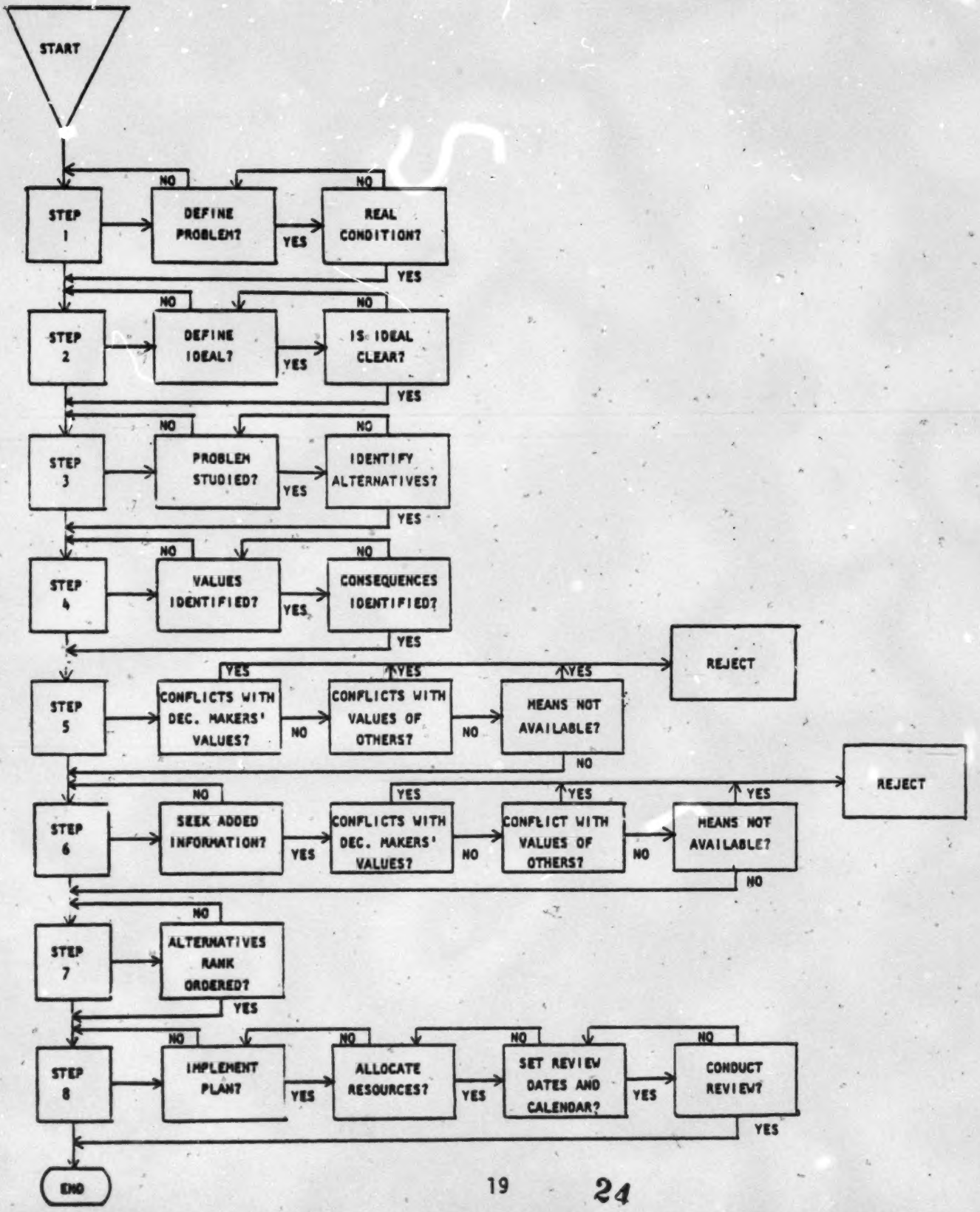
Decision Making for Social Action: A Flow Chart

The five steps of the mixed-scanning model have a number of subroutines. It is often helpful to present steps graphically to identify the sequence that can be followed in the classroom. The scenario in the text of this paper follows each of the steps; the subroutines, however, are often lost in the give and take of a classroom simulation that deals with dynamic environmental issues.

The value of the flow chart rests in its identification of the discrete decision points. A teacher using the simulation for the first time may want to use the flow chart as a type of check list. Have the necessary steps been completed? Is a variation from the identified subroutines justified? Do students understand the rationale for each step in the decision-making model? The simulated steps of decision-making for social action are intended to establish a set of behaviors that will be transferable to real personal and societal problems.

Each routine in the sequence identifies an outcome. In the first step two outcomes are necessary. Has the problem been defined? Is the real condition clearly identified in the definition? The fifth step, when completed, should be able to provide information about three outcomes. First, do the consequences of an alternative conflict with the values of the decision maker? Second, are the values of other important participants conflicting with an alternative? Finally, are the means--time, human resources, or material resources--available to implement the alternative? Each decision point should be gathered if a clear negative or positive response is not possible.

DECISION MAKING FOR SOCIAL ACTION



APPENDIX B

Environmental Issues and Problem Areas

Crucial to the success of involving students in the decision making simulation is the identification of an issue or problem area with which students perceive a need to become involved. The extent and systematic particiaption will, of course, depend on the nature of the problem and level of student maturity. At the middle school/junior high school level, students will probably become more involved in problem areas associated with home and community environments. As they acquire more knowledge and experience with the decision making simulation, they will be in a better position in the late junior high and high school grades to deal with more sophisticated and complex problems at the state, national, and international levels. Young children in primary grades can also become involved in dimensions of the decision-making simulation. Within the limitations set by the cognitive development, they can deal quite realistically with environmental issues.

Here is a list of environmental issues and problem areas that teachers and students will find useful in stimulating active participation in decision making.

Local Level

1. Removal of Decaying Buildings
2. Unsightly Billboards and Advertising
3. Waste in Lakes, Streams, and Waterways
4. Controlling Soil, Water, and Wind Erosion
5. Use of Insecticides for Mosquito Control

6. Land Zoning for Commercial, Residental, and Recreational Purposes
7. Establishing and Maintaining Recycling Centers
8. Litter Along Roads and Highways
9. Decreasing Beauty of Our Landscape
10. Promoting Home Energy Conservation
11. Ecological Effects of Different Land Uses
12. Pest Management
13. Use of Fertilizers
14. Poisoning of Air and Water by the Wastes of Production
15. Accommodating Increasing Populations
16. Hunting and Killing of Animals
17. Social and Psychological Consequences of Crowding in Urban Areas
18. Use of Chemical Pesticides on Crops, Lawns, and Gardens
19. Development of Rapid Transit Systems
20. Insulation of Single and Multiple Dwellings

<u>County/State Levels</u>

1. Landfill Disposal Sites
2. Open Pit and Strip Mining of Coal
3. Regulating Burning of High Sulphur Coal
4. Noise Levels in Industrial Plants
5. Creation of Parks for Recreation and Camping
6. Establishing and Enforcing Emergency Gas Rationing Procedures
7. Educating Heavy Density Areas on Family Planning
8. Preventing and Controlling Forest Fires
9. Replacing Trees in Lumbering Areas
10. Establishing Model Communities
11. Dumping of Unprocessed Sewage in Waterways

12. Shrinkage of Living Space in Urban Centers
13. Vanishing Wildlife
14. Returnable Versus Nonreturnable Bottles and Cans
15. Water Management and Supply
16. Advanced Sewage and Solid Waste Disposal
17. Definition of Environmentally Controlled Areas
18. Ecological Effect of Human Activities on the Value and Resources of Lakes, Rivers, and Oceans
19. Discharge of Phosphates in Streams and Rivers
20. Acquisition of Public Land for Conservation Purposes

National/International Levels

1. Movement and Disposal of Toxic and Radioactive Waste
2. Exhaustion of Limited Resources
3. Destruction of the Ozone Layer
4. Use of Nuclear Energy to Generate Electricity
5. Detection and Prosecution of Industries Polluting the Air
6. Conservation of Oil and Gas
7. Controlling Population Growth in Underdeveloped Nations
8. Research and Development of Solar Energy
9. Influence of OPEC Control
10. Promoting Food Production Through Use of Insecticides
11. Control of Noise Pollution Caused by Supersonic Transports
12. Establishing a Safe Nuclear Energy Policy
13. Reforms in Distribution of the World's Food Supply
14. Life Style of Conspicuous Consumption
15. Proliferation of Junk Products

OCCASIONAL PAPERS

This is the fifth in a series of papers designed to provide interested people with some current information about environmental education. The occasional paper format was chosen because it provides for rapid production and, therefore, timeliness. The varied topics of these papers will allow them to be distributed to different and specific audiences, thereby reducing the possibility of unused or wasted copies. Other topics now being considered for publication are:

An Explanation of Appropriate Technology

School Land Laboratories: Their Use and Development

Resident Outdoor Education: Some Program Guidelines

Responsibilities of a School District Coordinator of Environmental Education

Suggestions for other topics will be welcome.

Authors for these papers will be Ohioans both in and out of the Ohio Department of Education and, therefore, the views expressed are those of the authors, and not necessarily those of the Ohio Department of Education.